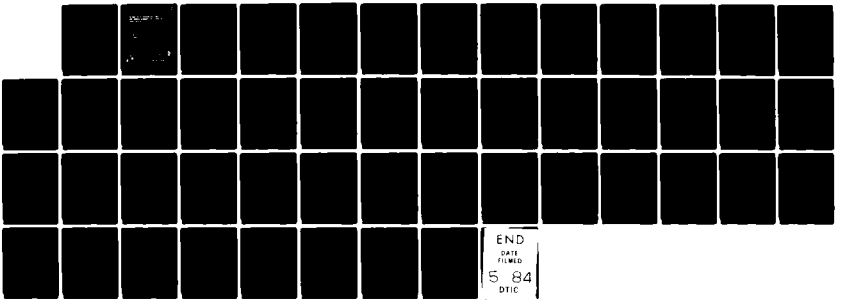
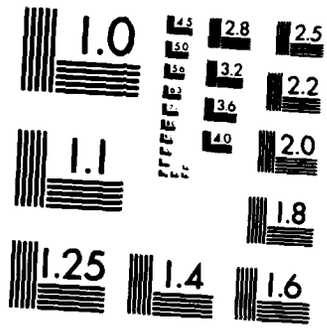
AD-A139 755 AN ANALYSIS OF BASELINE NAVY HEALTH AND PHYSICAL READINESS DATA FROM LOCAL SHORE FACILITIES(U) NAVAL HEALTH RESEARCH CENTER SAN DIEGO CA D S NICE ET AL. 1/1

UNCLASSIFIED JAN 84 NAVHLTHRSCHC-84-1 F/G 6/5 NL





AN ANALYSIS OF BASELINE NAVY HEALTH AND PHYSICAL READINESS DATA FROM LOCAL SHORE FACILITIES

B. S. RICE
L. BUTTON
G. E. SEYMOUR

REPORT NO. 84-1

NAVAL HEALTH RESEARCH CENTER
P. O. BOX 85122
SAN DIEGO, CALIFORNIA 92138

NAVAL MEDICAL RESEARCH AND DEVELOPMENT COMMAND
BETHESDA, MARYLAND

An Analysis of Baseline Navy Health and Physical Readiness Data from Local Shore Facilities

D. Stephen Nice, Linda Dutton,

and

George Edw. Seymour*

Naval Health Research Center

P.O. Box 85122

San Diego, California 92138

To expedite communication of our research, this is a preprint of a paper submitted to Aviation, Space and Environmental Medicine and should be cited as a personal communication.

Report No. 84-1, supported in part by the Naval Medical Research and Development Command, and the Naval Military Personnel Command (Code N-6H), Department of the Navy. The views presented in this paper are those of the authors. No endorsement by the Department of the Navy has been given or should be inferred.

*From the Health Psychology Department.

TABLE OF CONTENTS

	PAGE
SUMMARY	3
An Analysis of Baseline Navy Health and Physical Readiness Data from Local Shore Facilities	4
METHOD	5
Subjects	5
Procedure	6
RESULTS	7
Demographic Factors	7
1.5-Mile Run	8
Sit-ups	8
Sit-reach	8
Percent Body Fat	8
Classification Ratings	9
1.5-Mile Run ratings	9
Sit-ups ratings	10
Sit-reach ratings	10
Percent Body Fat ratings	10
Overall Classification ratings	10
Reliability	11
1.5-Mile Run	11
Sit-ups	12
Sit-reach	12
Percent Body Fat	13
Overall Classification	14
DISCUSSION	14
REFERENCES	18
TABLES	21
FIGURES	25
APPENDICES	32

SUMMARY

In recognition of the importance of health, physical fitness and life style behaviors, the Navy recently promulgated OPNAVINST 6110.1B which established the Health and Physical Readiness Program. This program promotes vigorous and active health and fitness activities at the command level and mandates an annual physical fitness test with a series of graded physical performance standards. These physical performance standards include: (a) strength and muscular endurance (Sit-ups), (b) stamina and cardiorespiratory endurance (1.5-Mile Run), (c) flexibility (Sit-reach), and (d) body composition (Percent Body Fat).

The purpose of the present study was to (a) provide a baseline assessment of each of the physical readiness test scores, (b) examine the relationship between physical readiness and demographic factors, and (c) assess the reliability of physical readiness test procedures in the field. Data were collected from 6,182 Navy personnel at 22 shore commands in the San Diego area. Results indicated that the relationships between specific demographic factors, such as age and/or sex, and each of the Health and Physical Readiness (H&PR) tests were statistically significant but accounted for relatively small amounts of the variance.

The distributions of classification ratings for the 1.5-Mile Run and the Sit-ups test were fairly symmetrical, but the distributions for the Sit-reach and Percent Body Fat were negatively skewed such that modal classifications were outstanding. A total of 22% of the sample failed to meet the overall minimum standard which is set equivalent to the lowest rating obtained by an individual. Inadequate performance in the Percent Body Fat and the 1.5-Mile Run tests contributed substantially to the overall failure rate.

Further research is needed to determine the relationship between these physical readiness test scores and organizationally relevant outcomes (e.g., health, performance, retention) and to evaluate the impact of various program interventions.

An Analysis of Baseline Navy Health and Physical Readiness Data from Local Shore Facilities

Over the past decade, Americans have become increasingly aware of the extent to which personal behavior affects a variety of health-related outcomes. Reports on the terrible costs of smoking have been followed by attempts to trace the impact of exercise, diet, work patterns, and leisure styles on the incidence and prevalence of disease and mortality (Dworkin, 1981).

Physical exercise has become increasingly popular and has received widespread research attention from the standpoint of both cardiovascular risk reduction and life-quality enhancement. Although physical inactivity has been intimately associated with obesity and premature cardiovascular disease (Fox & Haskell, 1968; Morris, Everitt, Pollard, Chave, & Semmence, 1980; Kannel & Sorlie, 1979), habitual physical activity has been associated with decreases in depression (Greist, Klein, Eischens, Gurman, & Morgan, 1979), decreases in anxiety (Morgan, 1981; de Vries, 1981), improved self concept (Folkins & Sime, 1981), increased slow-wave sleep (Griffin & Trinder, 1978), reduced absenteeism (Donoghue, 1977), and improved job performance (Donoghue, 1977).

In recognition of the importance of health, physical fitness, and life-style behaviors, the Navy recently promulated OPNAVINST 6110.1B, the Health and Physical Readiness (H&PR) Program. The purpose of this instruction is to implement a program to establish minimum criteria for physical fitness and weight control, provide guidance for meeting minimum standards, and emphasize the need for all personnel to show concern for and participate in personal life-style enhancing activities.

The major emphasis of this instruction is placed on promoting vigorous and active health and fitness programs at the command level. An annual physical fitness test, with a series of graded physical performance standards, has been included to provide an assessment of physical readiness. These physical performance standards include: (a) strength and muscular endurance (Sit-ups), (b) stamina and cardiorespiratory endurance (1.5-Mile Run test), (c) flexibility (Sit-reach test), and (d) body composition (Percent Body Fat).

Beginning in Fiscal Year 1984 (FY84), the new standards become effective and a variety of command programs will emerge to encourage physical readiness. In

order to anticipate the number of members who may fail to meet minimum standards in FY84 and to assess the effectiveness of various interventions, it is necessary to collect baseline physical readiness test data prior to program implementation. Therefore, the purpose of the present investigation was to (a) develop a baseline assessment of each of the physical readiness test scores, (b) examine the relationship between physical readiness and demographic factors, and (c) assess the reliability of physical readiness test procedures in the field.

METHOD

Subjects

In June 1983, all shorebased commands in the San Diego area that were headed by captains (N = 53) were contacted by telephone to determine the approximate personnel strength and the status of the Health and Physical Readiness testing program. Those commands which had a personnel strength of less than 50 (N = 11) or which did not anticipate testing during FY83 (N = 11) were not included in the sample. The remaining 31 commands were contacted by letter and asked to participate in the study.

The primary requirement for participation was that the command conduct the Health and Physical Readiness (H&PR) testing prior to the end of FY83 and provide individual test results and demographic information to the Naval Health Research Center (NHRC). In response to this request, 19 San Diego-based commands (N = 5,902) provided H&PR data. Additional data were received from Command Fitness Coordinators at Point Mugu, California (N = 148), Widbey Island, Washington (N = 53), and Moffett Field, California (N = 79). Therefore, the total sample consisted of 6,182 Navy personnel from 22 commands.

The sample averaged 30 years of age (range 17 to 61 years) and consisted primarily of males (86%). The majority of the sample was composed of enlisted personnel (93%)[1] with a modal pay grade of E-6. A total of 100 rates, or 83% of all the rates in the Navy, were represented in the sample. For the purpose of statistical analysis, these rates were classified on the basis of muscularly demanding Navy occupations (Robertson & Trent, 1983). This procedure created a rate dichotomy and indicated that 32% of the sample were in rates which were muscularly demanding.

---

[1]These figures correspond with Navy Military Personnel Statistics (NAVPERS 15658) of March 1983 which indicate 92% males and 88% enlisted personnel Navywide.

Procedure

In early July, liaison was established between the research staff at NHRC and the Command Fitness Coordinators (CFCs) at the participating commands. If H&PR testing had been completed and no further testing was scheduled, results were forwarded to NHRC and integrated into the data set. If H&PR testing was scheduled, physical fitness test result forms (Appendix A) were made available to facilitate data collection and standardize data entry formats. These one-page forms, with no-carbon-required duplicates, were designed to capture three data segments which included Background Information, Body Measurements, and Test Scores. Background Information consisted of: (a) duty station, (b) date, (c) name, (d) social security number, (e) age, (f) rate/rank, and (g) sex.

Body Measurements included height, weight, and circumference measures. Circumference measures for female subjects included neck, abdomen, bicep, forearm, and thigh. Only the neck and abdomen measures were required for male subjects. These circumference measures were then used to compute percentage of body fat as described in the Percent Fat Prediction Tables included in OPNAVINST 6110.1B.[2]

The Test Score data included the percentage of body fat, the number of sit-ups completed in two minutes, the positive or negative distance of the reach from the heels while in a sitting position, and the time for the 1.5-mile run. The Test Scores section also included a tabled classification rating for each test. These seven classification ratings included Outstanding, Excellent, Good, Satisfactory, Minimal, Fail, and Medical Excuse. The Overall Classification rating was set equivalent to the lowest classification rating on any of the four tests.

In those instances in which a command had scheduled the H&PR testing (N = 14), an NHRC research team, composed of two to six members, visited the test site to collect reliability data.[3] This team consisted of four hospital corpsmen working in the Exercise Physiology Program at NHRC, a graduate student in Public Health with a Bachelor of Science degree in Exercise Physiology, and a Research Psychologist. All members were thoroughly familiar with OPNAVINST 6110.1B and were trained in circumference measurement techniques to a criterion of 1 cm.

---

[2]Percent Body Fat prediction tables for women and men were derived from the work of Wright, Dotson, and Davis (1980) and (1981), respectively.

[3]Permission was requested for NHRC personnel to collect independent data on a subset of participants to assess the clarity and feasibility of OPNAVINST 6110.1B for field tests.

Reliability data were collected on a sample of 251 personnel. The demographic composition of this subset was similar to the total sample in terms of age (mean = 30 years), sex (80% male), pay grade (mode = E-6), and officer/enlisted status (93% enlisted). In this reliability sample, measurements obtained by NHRC personnel were compared with measurements obtained by CFCs. This procedure provided an index of measurement reliability in the field.

RESULTS

The results of this study are organized into sections which (a) identify relationships between demographic factors and H&PR test performance, (b) describe the pattern of classification ratings, and (c) assess the reliability of the data collection and the accuracy of the computational procedures for the classification ratings.

In order to assess the stability of the results, the sample was stratified by age and sex and was divided into two equivalent groups, Group 1 and Group 2. As shown in Table 1, the groups were evenly matched in terms of size, number of commands included, sex, age, officer/enlisted status, and percentage of personnel in muscularly demanding ratings. This stratified grouping procedure provided for the cross-validation or replication of statistical analyses.

Demographic Factors

As a descriptive overview, mean H&PR test scores are presented by age and sex in Table 2. In each of the four H&PR test categories, multiple regression procedures were used to determine the relationship between demographic characteristics and test performance. Demographic variables included sex (male, female), age (18-29, 30-34, 35 and above), military status (officer, enlisted), and muscular demands of rate (muscularly demanding, not muscularly demanding). Pearson correlation coefficients were computed on Group 1 data to identify the degree of association between demographic variables and H&PR test scores (Table 3). Within the Group 1 data set, the demographic factors which demonstrated a correlation coefficient greater than .11 with a given test score were entered into a stepwise multiple regression procedure to assess the independent contribution of each variable.

In the cross-validation procedure, the significant unstandardized regression coefficients developed on Group 1 were applied to Group 2. In Group 2, individual predicted criterion scores were computed by multiplying the relevant demographic variables by their respective unstandardized regression coefficients, summing the

products, and adding the Group 1 means as a constant. These predicted scores were then correlated with the actual Group 2 test scores to provide an index of the stability of the relationships across samples.

1.5-Mile Run. In Group 1, the variables sex and age were entered into a stepwise multiple regression analysis with the 1.5-Mile Run data. Both variables contributed significantly to the equation and yielded a multiple R of .44 (Appendix B). These results indicated that males and younger personnel had faster run times than females and older personnel (Figure 1). In the cross-validation procedure in Group 2, a Pearson r of .39 was obtained between the predicted scores, based on the Group 1 equation, and the actual Group 2 scores.

In order to provide an additional perspective, the 1.5-Mile Run times obtained in the present study were compared with data from a sample of 412 male and 15 female police officers in California (Wilmore & Davis, 1979). Although the male (mean age = 33.6 years) and female (mean age = 27.3 years) police officers were three years older than the respective Navy samples, the mean ages were considered close enough for data comparison purposes. Among the males, the average 1.5-Mile Run times were the same for the police officers (13.1 minutes) and the Navy personnel (13.1 minutes). In the female samples, however, the 1.5-Mile Run time for the police officers (13.9 minutes) was considerably faster than the run time for the Navy women (15.0 minutes).

Sit-ups. In Group 1, only the variable age demonstrated an adequate relationship with the Sit-ups test scores (r = -.36). This correlation coefficient between age and Sit-ups was then recomputed in Group 2. In this sample, the correlation was somewhat smaller than expected (r = -.30), but again produced a significant effect.

Sit-reach. The variables age and sex demonstrated significant zero-order relationships with Sit-reach scores and were entered into the stepwise multiple regression analysis. In this analysis, only age contributed significantly to the equation (r = .24) (Appendix B). This analysis demonstrated that younger members performed better in the Sit-reach than older members. The correlation coefficient between age and Sit-reach was recomputed in Group 2 and replicated the original finding (r = .24).

Percent Body Fat. The variables sex and age were entered into a stepwise multiple regression analysis with Percent Body Fat. Both age and sex contributed significantly to the equation and produced a multiple R of .38 (Appendix B). As

shown in Figure 2, women and older personnel had a higher percentage of body fat than men or younger personnel. These results were cross-validated in Group 2 and produced a Pearson r of .30.

As shown in Table 4, the mean Percent Body Fat among Navy men was consistently less than the mean Percent Body Fat among other groups of American males. Likewise, the mean Percent Body Fat of Navy women in the present study (21.5%) was lower than the mean value for women police officers (25.1%) reported by Wilmore and Davis (1979).

Classification Ratings

In the transformation of test scores into classification ratings, a set of age- and sex-related adjustment factors are applied through the Physical Readiness Classification Table in OPNAVINST 6110.1B. Because these individual classification ratings may affect a variety of actions ranging from positive awards and incentives to remedial programs and administrative sanctions, it is important to assess the anticipated distribution of classification ratings among the active duty members. It is also important to assess the compensatory effect of the Physical Readiness Classification Tables on age- and sex-related differences in actual test performance. In the remainder of this section, the distributions of classification ratings for each of the H&PR tests will be presented. In addition, multiple regression analyses will be computed to determine the relationship between classification ratings and age and sex. A complete tabulation of classification ratings on all H&PR tests by age and sex is presented in Appendix C. The potential error introduced by computational inaccuracies in the transformation of scores is addressed in the reliability section of this report.

1.5-Mile Run ratings. As shown in Figure 3, the distribution of classification ratings in the 1.5-Mile Run was fairly normal. On the 6-point scale, which ranged from Fail (1) to Outstanding (6), the mean rating was 3.6 (Satisfactory/Good), and the standard deviation was 1.25. A total of 10% of the sample failed to meet the minimum standards on this test. The mean classification ratings in Group 1 (mean = 3.5) and Group 2 (mean = 3.6) were quite similar and supported the generalization of these results across samples.

A stepwise multiple regression analysis was computed to determine relationships between the 1.5-Mile Run classification ratings and age and sex. This analysis produced a multiple R of .08 and indicated that the 1.5-Mile Run classification ratings were generally unrelated to age and sex.

Sit-ups ratings. The distribution of the classification ratings for the Sit-ups was approximately normal (Figure 4). The mean classification rating was 3.4 (Satisfactory/Good), and the standard deviation was 1.04. A total of 2% of the sample failed to meet the minimum standards on the Sit-ups test. The mean classification ratings in Group 1 (mean = 3.4) and Group 2 (mean = 3.5) were quite similar.

A stepwise multiple regression was computed to determine the effects of age and sex on classification ratings for the Sit-ups test. In this analysis, age entered the equation with a significant r of .22 and indicated that younger service members received higher classification ratings than older members. The variable sex was generally unrelated to classification rating.

Sit-reach ratings. As shown in Figure 5, the distribution of Sit-reach classification ratings was highly skewed. The mean classification rating was 5.0 (Excellent), and the standard deviation was 1.48. Although the modal classification rating was Outstanding, a total of 6% of the sample failed to meet the minimum standards. The mean classification ratings for Group 1 (mean = 4.8) and Group 2 (mean = 5.1) were quite comparable. A multiple regression analysis indicated that neither sex nor age contributed in any meaningful way (R^2 = .02) to the Sit-reach classification ratings.

Percent Body Fat ratings. The Percent Body Fat classification ratings were not normally distributed (Figure 6). Overall, the distribution was fairly flat with a peak in the modal category of Outstanding. The mean Percent Body Fat classification rating was 4.1 (Good), and the standard deviation was 1.8. A total of 13% of the sample failed to meet the minimum standards for Percent Body Fat. The mean classification ratings for Group 1 (mean = 4.0) and Group 2 (mean = 4.1) were very similar. The stepwise multiple regression analysis indicated that the Percent Body Fat classification rating was significantly associated with age (r = .22), such that older people received lower classification ratings. Sex did not meaningfully contribute to the equation.

Overall Classification ratings. The Overall Classification rating for an individual is set equivalent to his or her lowest classification rating on any of the four H&PR tests. This Overall Classification rating thus forms the basis for the H&PR performance evaluation. As shown in Figure 7, relatively few individuals received Excellent or Outstanding ratings. The mean Overall Classification rating was 2.7 (Minimal/Satisfactory), and the standard deviation was 1.2. A total of

22% of the sample failed to meet the minimum Overall Classification standard. Within this group, 79% of the members failed to meet only one of the four minimum standards, 18% failed to meet two of the four standards, and 3% failed to meet three of the four. Of the 622 individuals who failed only one standard, 47% failed the Percent Body Fat, 29% failed the 1.5-mile Run, 19% failed the Sit-reach, and 5% failed the Sit-ups. A total of 149 individuals failed to meet the minimum standards on two of the four H&PR tests. Of the six possible combinations of failure on two of the four tests[4], the majority of individuals (60%) failed to meet the Run and the Body Fat standards. Of the 24 individuals who failed to meet three of the four H&PR standards, the majority failed either the Run, Body Fat, and Sit-ups (42%) or the Run, Body Fat, and Sit-reach (38%).

Reliability

The reliability of H&PR test data is affected by the consistency of the measurement techniques and the accuracy of the transformations from raw scores to classification ratings. In this section, the reliability of each of the H&PR tests will be addressed from both a measurement and a computational perspective. Comparisons of Group 1 and Group 2 transformation accuracy on each of the H&PR tests demonstrated a high degree of consistency and are presented in Appendix D.

1.5-Mile Run. During the course of the study, a total of six 1.5-Mile Run courses were measured using a calibrated hand-held wheel on temporary loan from the California Department of Transportation. These measurements indicated that two of the courses were too short (mean = 168 ft.) and four were too long (mean = 203 ft.). Course length ranged from 7,605 feet (-315 ft.) to 8,214 feet (+294 ft.). Unavailability of the calibrated wheel precluded the measurement of all courses, but NHRC personnel believed there was considerable variability in course length.

At ten individual test sites, NHRC personnel conducted an independent assessment of run times on a haphazardly selected subset of the personnel being tested (N = 98). A comparison of the run times collected by NHRC personnel with the run times submitted by the Command Fitness Coordinators produced a Pearson r of .98 ($p < .001$).

---

[4] The binomial coefficient of four events taken two at a time irrespective of order is $\frac{4!}{2!(4-2)!}$.

To assess the accuracy of the data transformations from actual run times to classification ratings, run times were transformed into classification ratings by computer and cross-tabulated with field classification ratings obtained from the same data. In 2,551 cases, or 90% of the 2,845 cases in which both run times and classification ratings were submitted, the field classification ratings were computed correctly. Although the vast majority (99%) of classification errors in the field resulted in a discrepancy of only one rating category, these errors generally favored the participant. In the 294 cases in which an error in data transformation occurred, 235 (80%) resulted in a more positive rating.

Sit-ups. The Sit-ups test was typically conducted on half of the test group at a time, while the second half served as partners. Because large numbers of personnel were tested simultaneously, it was not feasible for the small NHRC staff to monitor the performance of a group sufficiently large to determine the reliability of Sit-up counts. Observations at the test sites, however, indicated that procedures outlined in OPNAVINST 6110.1B were not followed in the majority of cases. For example, heels were generally further than 10 inches from the buttocks, arms were not folded across the chest, and shoulders did not touch the floor after each repetition. Although the net effect of these variations is unclear, it is apparent that testing procedures were not followed carefully.

In those cases in which number of Sit-ups and classification ratings were submitted from the field (N = 2,922), the accuracy of the classification rating was assessed. In 2,801 cases (96%), the classification rating was computed correctly in the field. When a discrepancy did occur, the error tended to favor the participant (64%).

Sit-reach. A total of 74 participants at six different test sites were haphazardly selected and retested by NHRC staff to determine the reliability of the Sit-reach test. The comparison of the CFC and NHRC measurements yielded a Pearson r of .78. Although this correlation represents a moderate but acceptable degree of association between the independent measurements, NHRC personnel retrospectively noted some procedural differences between the six sites at which reliability data were collected and the other eight test sites which were visited. Generally speaking, the NHRC staff believed that the test procedures at the six sites at which reliability data were collected conformed more closely with those

promulgated in OPNAVINST 6110.1B.[5] At the other test sites, measurement techniques were imprecise and many participants bent their knees slightly or bounced to obtain maximum extension in the Sit-reach.

A comparison of the mean Sit-reach scores for all participants at the reliability data test sites (N = 1,020) and at the other sites which were visited (N = 4,856) supported the speculation that procedural differences may have existed. The mean score at the sites where reliability data were collected was 1.0 inches (Good) while the mean score at the other sites was 2.3 inches (Excellent) [$t(5874) = 12.4$, $p < .001$]. These differences suggest that the reliability estimate as well as the overall test scores in the Sit-reach may be inflated.

The accuracy of the transformation from raw scores to classification ratings was assessed in all cases in which raw scores and classification ratings were provided from the field (N = 2,909). In 97% of the cases, the classification rating was correctly obtained. When inaccurate transformations did occur, there was only a slight bias (57%) toward classification ratings which were less favorable than the true rating.

Percent Body Fat. The reliability data for Percent Body Fat consisted of circumference measurements collected from 230 males and 47 females at 14 different test sites. Measurements required to predict body fat among males included the circumference of the neck and abdomen. Additional circumference measures of bicep, forearm, and thigh were required for women. A comparison of the CFC measures and NHRC measures yielded the following results: neck, $r = .91$,; abdomen, $r = .91$,; bicep, $r = .79$,; forearm, $r = .80$, and thigh, $r = .90$.

The reliability of the bicep and forearm measures are believed to be somewhat lower because the measurement is taken over the largest circumference rather than at a specific anatomical reference point. NHRC personnel used a sliding technique with the tape to locate the point of maximum circumference while CFCs did not. This difference in technique is believed to have contributed to the reduced reliabilities on the bicep and forearm measures. On balance, however, the reliabilities of the circumference measures in the field were quite acceptable.

---

[5]Although it may appear that the collection of reliability data per se may have affected test procedures, this was not believed to be the case. Reliability data collection, for example, was generally initiated well after the Sit-reach testing had begun. CFCs were not aware that reliability data would be collected and did not modify procedures when NHRC data collection began.

The overall reliability of the Percent Body Fat scores was assessed by comparing Body Fat scores computed from NHRC measurements with Body Fat scores submitted by CFCs on the same personnel (N = 187). This comparison produced a correlation coefficient of .84 and demonstrated a satisfactory level of reliability of Body Fat scores obtained in the field.

The computation of body composition classification ratings involved a two-step process. In the first step, circumference measurements were used to enter prediction tables for estimated Percent Body Fat. Secondly, these Percent Body Fat estimates were transformed into classification ratings. The accuracy of the Percent Body Fat computations was assessed by correlating field body fat scores with computer generated scores based on the circumference data provided by the CFCs (N = 3,485). This analysis demonstrated a high degree of association (r = .97, $p < .001$). Although the computational procedures for Percent Body Fat for women were more complex than those for men, the degree of association between field scores and computer generated scores was not substantially different for men (r = .97) and women (r = .95). That is to say, the accuracy of Percent Body Fat computations for both men and women in the field was quite high.

In those cases in which Percent Body Fat and the Body Fat classification ratings were submitted from the field (N = 2,078), classification ratings were checked for accuracy. In 1,815 cases (87%), the classification rating was appropriate for the Percent Body Fat score. When classification errors did occur, they favored the participant in 62% of the cases.

Overall Classification. The accuracy of the Overall Classification was assessed by checking the frequency with which the Overall Classification rating corresponded to the minimum classification rating obtained by an individual. In 79% of the cases, the Overall Classification rating was correctly obtained. The majority of the errors favored the participants (88%). Many of these discrepancies occurred because individual classification ratings were often averaged to produce the Overall Classification rating.

DISCUSSION

In OPNAVINST 6110.1B, the Navy implicitly defines physical readiness as a combination of an individual's body composition and his/her functional capacity to perform certain kinds of tasks requiring muscular activity. The specific tests include the 1.5-Mile Run, Sit-ups, Sit-reach, and Percent Body Fat and are used to assess conceptually different aspects of physical readiness. In the present study,

the correlations between these H&PR test scores ranged from low (r = -.13) to moderate (r = -.54) (see Table 3). Because the reliabilities of these measures appear acceptable, the low to moderate inter-test correlations support the premise that these tests assess somewhat different aspects of physical readiness.[6]

In each of the four H&PR tests, performance was significantly related to demographic factors. In the 1.5-Mile Run, which was used as a measure of stamina and cardiorespiratory endurance, higher levels of performance were obtained by males and younger personnel. These sex- and age-related differences are consistent with previous reports on maximal aerobic capacity (Astrand & Rodahl, 1970; Froelicher, Allen, & Lancaster, 1974) and run times (Patton, Daniels, & Vogel, 1980; Daniels, Kowal, Vogel, & Stauffer, 1979; Sharkey, 1979; Cooper, 1970).

It is important to note, however, that while the relationship between 1.5-Mile Run time and age and sex is highly significant, the actual effect is rather small. Given the results of the val-cross-val regression analysis, only 15% to 19% of the variation in run times among individuals in this study can be accounted for by age and sex.

The overall 1.5-Mile Run performance of male Navy personnel in this study was quite comparable with the performance of a group of police officers studied by Wilmore and Davis (1979). The mean 1.5-Mile Run time of the female Navy personnel, however, was one minute longer than the mean time of the female police officers. Of course, the sample of females in the Wilmore and Davis study was quite small (N = 15) and may not have been representative of the population.

Performance in the Sit-reach and Sit-ups tests was negatively associated with the age of the service member. However, the variation in age accounted for a relatively small percentage of the variation in either the Sit-ups (13%) or the Sit-reach (6%). Observations at the 14 test sites indicated substantial deviations from the Sit-ups and Sit-reach procedures outlined in OPNAVINST 6110.1B. Such deviations introduce error variance into the outcome variable and may have attenuated the effect of demographic factors. Similarly, the lack of rigorous test procedures in the Sit-reach test may have artifically inflated the performance scores.

---

[6] It is interesting to note that the relationship between Percent Body Fat and Run Time (r = .43) supports previously reported associations (r = -.50 to -.60) between percent body fat and aerobic capacity (Vogel, 1982; Hodgdon, 1978).

In the body composition test, field estimates of Percent Body Fat were generally reliable and demonstrated significant associations with age and sex. The finding that women and older individuals have a higher percent body fat than men or younger individuals is consistent with previous literature (Mickelsen, 1958; Sharkey, 1979; Wilmore & Davis, 1979; Krzywicki & Chinn, 1967). In the present study, however, only about 14% of the variation in Percent Body Fat could be accounted for by variation in sex and age.

The Percent Body Fat of the males in the present Navy sample was consistently below the mean levels reported for other groups of American males (Wilmore & Davis, 1979) and other groups of Navy personnel (Wright, Dotson, & Bachinski, 1980; Hodgdon & Marcinik, 1983). Although some of the differences may be accounted for by between-study variations in measurement and estimation technique, the circumference approach has demonstrated sufficient validity in the literature (Wright et al., 1980, 1981) and was found to be adequately reliable in the present study. Therefore, it is concluded that the males in this large Navy sample have a slightly lower average percent body fat than comparably aged American males in other groups.

In general, the relationships between specific demographic factors, such as age and/or sex, and each of the H&PR tests were statistically significant but accounted for relatively small amounts of the variance. It is also interesting to note that other demographic variables, such as military status and muscular demands of rate, had virtually no effect upon H&PR test performance. Although these statistical relationships were somewhat attenuated by factors such as unequal sampling by sex, restriction in range of age among women, intercorrelation between age and sex, and measurement error, it is clear that factors other than demographics are important determiners of performance.

Motivation, for example, plays an important role both in training to enhance the physical strength and endurance of the body and in actual test performance. As Astrand and Rodahl (1970) point out in their Textbook of Work Physiology, "...abilities and physical capacities alone may be of little use unless the individual is motivated to devote all his endowment and capacity to their full limits in the attainment of specific goals..." (p. 315). The Navy Health and Physical Readiness Program recognizes the important role of personal motivation and recommends a variety of incentives to encourage physical conditioning and H&PR test performance.

The individual classification ratings on each of the H&PR tests form the primary evaluative component of the program. The distributions of classification ratings for the 1.5-Mile Run and the Sit-ups test were fairly symmetrical, but the distributions for the Sit-reach and the Percent Body Fat ratings were skewed such that the modal classifications were Outstanding. Although the reliability data on the Sit-reach test appeared acceptable, the field research team observed widespread deviations from the procedures established in OPNAVINST 6110.1B. Because reliability data for this test may have been collected on an unrepresentative subset of the sample, there is reason to believe that the Sit-reach ratings may be inflated.

The percentage of personnel who failed to meet minimum standards ranged from 2% in the Sit-ups test to 13% in the Body Composition.[7] However, a total of 22% of the sample failed to meet the minimum Overall Classification standard, which is set equivalent to the lowest rating obtained by an individual. Although the majority of these individuals failed to meet the minimum standards for only one (79%) or two (18%) of the tests, the high overall failure rate is clearly a matter of concern for the Navy.

As Navy personnel become more familiar with the testing procedures, receive performance feedback, and participate in physical training or life-style modification programs, the number of failures will surely diminish. As the Health and Physical Readiness Program matures, however, a number of difficult and challenging issues will emerge.

Further standardization of all test procedures is required to improve the quality and the reliability of the data. Improved and more widespread training of CFCs and their assistants is recommended to reduce measurement error and facilitate the transformation of raw scores to classification ratings. The use of standardized data collection instruments (e.g., Appendix A) would simplify data acquisition and transfer processes.

The validity of the H&PR tests represents an equally important issue which should be addressed in future research. Specific organizational goals and rationale for the H&PR program should be identified and assessed. While the spirit of OPNAVINST 6110.1B is positive and progressive, the specter of

---

[7] In this study 14.3% of the males failed to meet the minimum Percent Body Fat standard. This is only slightly less than the 15.8% failure rate predicted by Hodgdon and Marcinik (1983).

administrative sanctions for poor H&PR performers is often psychologically preemptive and focuses attention on the potential dismissal of otherwise valuable Navy personnel. Research which demonstrates the associations between H&PR test results and organizationally important health or performance outcomes would increase the focus and enhance the credibility of the program. Alternatively, the lack of demonstrated relationships between H&PR test results and organizationally relevant outcomes may pose serious legal challenges to proposed adverse administrative actions.

Increased support for exercise/conditioning, nutrition, and other programs to improve test performance and modify life-style behaviors would reflect the true spirit of the program and further promote compliance in the fleet. Continued research is necessary to evaluate the effectiveness of specific program interventions and to monitor Navywide progress in meeting the goals and standards of the Health and Physical Readiness Program.

This study has presented an overview of the H&PR test performance of a large sample of Navy personnel assigned to shore activities in the San Diego area. While the generalization of these results to other Navy populations is not fully warranted, the internal replication of the material presented in this report lends confidence to the data and implies stability in the findings. Therefore, these data are considered an important benchmark for the future evaluation of the Navy H&PR program.

REFERENCES

Astrand, P. O., and Rodahl, K. (1970). Textbook of work physiology. New York: McGraw-Hill.

Cooper, K. H. (1970). The new aerobics. New York: Bantam.

Daniels, W. L., Kowal, D. M., Vogel, J. A., and Stauffer, R.M. (1979). Physiological effects of a military training program on male and female cadets. Aviation, Space, and Environmental Medicine, 50(6), 562-566.

de Vries, H. A. (1981). Tranquilizer effects of exercise: A critical review. The Physician and Sports Medicine, 9, 46-53.

Donoghue, S. (1977). The correlation between physical fitness, absenteeism and work performance. Canadian Journal of Public Health, 68, 201-203.

Dworkin, G. (1981). Taking risks, assessing responsibility. The Hastings Center Report, 10, 26-31.

Folkins, C. H., and Sime, W. E. (1981). Physical fitness training and mental health. American Psychologist, 36, 373-389.

Fox, S. M., and Haskell, W. L. (1968). Physical activity and the prevention of coronary heart disease. Bulletin of the New York Academy of Medicine, 44, 950-967.

Froelicher, V. F., Allen, M., and Lancaster, M. C. (1974). Maximal treadmill testing of normal USAF aircrewmen. Aerospace Medicine, 45, 310-315.

Greist, J. H., Klein, M. H., Eischens, J. F., Gurman, A. S., and Morgan, W. P. (1979). Running as treatment for depression. Comprehensive Psychiatry, 20, 41-54.

Griffin, S. J., and Trinder, J. (1978). Physical fitness, exercise, and human sleep. Psychophysiology, 15(5), 447-450.

Hodgdon, J. A. (1978). [Aerobic capacity and percent body fat]. Unpublished raw data.

Hodgdon, J. A., and Marcinik, E. J. (1983). A survey of body fat content of U.S. Navy male personnel. (Report No. 83-4). San Diego, CA: Naval Health Research Center.

Kannel, W. B., and Sorlie, P. (1979). Some health benefits of physical activity. Archives of Internal Medicine, 139, 857-861.

Krzywicki, H. J., and Chinn, K. S. K. (1967). Body composition of a military population, Fort Carson, 1963: I. Body density, fat, and Potassium 40. American Journal of Clinical Nutrition, 20, 708-715.

Mickelsen, O. (1958). Age changes in body composition. Public Health Reports, 73(4), 295-301.

Morgan, W. P. (1981). Psychological benefits of physical activity. In F. Nagle and H. Montoye (Eds.), Exercise, health, and disease. Springfield, IL: Charles C. Thomas.

Morris, J. N., Everitt, M. G., Pollard, R., Chave, S. P. W., and Semmence, A. M. (1980). Vigorous exercise in leisure-time: Protection against coronary heart disease. Lancet, 2, 1207-1210.

Patton, J. F., Daniels, W. L., and Vogel, J. A. (1980). Aerobic power and body fat of men and women during Army basic training. Aviation, Space, and Environmental Medicine, 51(5), 492-496.

Robertson, D. W., and Trent, T. T. (1983, August). Predicting muscularly demanding job performance in Navy occupations. Paper presented at the Annual Convention of the American Psychological Association, Anaheim, CA.

Sharkey, B. J. (1979). Physiology of fitness. Champaign, IL: Human Kinetics Publishers.

Vogel, J. A. (1982). Revision of the U.S. Army's weight control program. In Summary of the Proceedings of the 4th Meeting of RSG4 Physical Fitness with Special Reference to Military Forces. (NATO Report #DS/A/DR(82)73, pp. 44-45).

Wilmore, J. H., and Davis, J. A. (1979). Validation of a physical abilities field test for the selection of state traffic officers. Journal of Occupational Medicine, 21(1), 33-40.

Wright, H. F., Dotson, C. O., and Bachinski, T. L. (1980). An investigation of fitness, and health parameters in a U.S. Navy population. (Contract #N00014-80-C-0558, Task #NR206-007, Final Report 30 November 1980). Washington, DC: Office of Naval Research.

Wright, H. F., Dotson, C. O., and Davis, P. O. (1980). An investigation of assessment techniques for body composition of women marines. U.S. Navy Medicine, 71(5), 15-26.

Wright, H. F., Dotson, C. O., and Davis, P. O. (1981). A simple technique for measurement of percent of body fat in man. U.S. Navy Medicine, 72(5), 23-27.

Table 1

Demographic Characteristics of

Cross-Validation Groups 1 and 2

Variable	Group 1	Group 2
Number of Participants	3,172	3,010
Number of Commands	11	11
Mean Age	30.6 years	29.1 years
Percent Enlisted	92.6%	93.0%
Percent Male	85.5%	86.4%
% Muscularly Demanding Rates	30.2%	36.5%

Table 2

Means and Standard Deviations for Health and Physical Readiness Test Scores

by Age Group and Sex

Test	Age Group											
	18-29			30-34			35 and Older			Overall		
1.5 Mile Run	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
Men	2309	12:29	2:00	918	13:32	2:10	1333	14:11	2:16	4560	13:11	2:14
Women	608	14:55	2:05	86	15:29	2:09	24	16:22	2:19	718	15:02	2:07
Overall	2917	12:59	2:15	1004	13:42	2:14	1357	14:13	2:17	5278	13:26	2:19
Sit-ups												
Men	2354	53.6	16.8	943	44.9	14.8	1375	40.0	14.1	4672	47.8	16.7
Women	634	49.4	17.3	90	41.0	17.0	26	43.1	18.4	750	48.2	17.5
Overall	2988	52.7	17.0	1033	44.6	15.0	1401	40.1	14.2	5422	47.9	16.8
Sit-reach												
Men	2356	2.5	2.9	940	1.7	3.0	1367	1.0	3.1	4663	1.9	3.1
Women	632	3.6	2.9	92	2.8	3.3	27	1.7	3.7	751	3.4	3.0
Overall	2988	2.7	3.0	1032	1.8	3.0	1394	1.0	3.1	5414	2.1	3.1
Percent Body Fat												
Men	2136	15.7	5.5	883	17.8	5.3	1342	18.3	5.0	4361	16.9	5.4
Women	579	21.2	5.5	76	22.6	6.3	26	24.4	4.6	681	21.5	5.6
Overall	2715	16.9	5.9	959	18.2	5.6	1368	18.2	5.0	5042	17.5	5.7

Table 3

Pearson Correlations among Demographic Variables and Fitness Measures for Group 1 (N = 3,172)

	Sex	Age	Military Status	Rate	Run Time	Sit-Ups	Sit Reach	% Body Fat
Sex[a]								
Age	-.30 (2743)							
Military Status[b]	.07 (2744)	.14 (2904)						
Rate[c]	-.18 (2684)	.05 (2844)	-.18 (2969)					
Run Time	.27 (2564)	.26 (2741)	-.08 (2763)	.04 (2705)				
Sit-ups	.02 (2638)	-.36 (2816)	.10 (2841)	-.10 (2783)	-.54 (3875)			
Sit-reach	.17 (2640)	-.24 (2817)	.08 (2842)	-.09 (2783)	-.21 (2869)	.30 (2949)		
Percent Body Fat	.31 (2515)	.12 (2665)	.02 (2666)	-.01 (2608)	.43 (2531)	-.26 (2603)	-.13 (2602)	

[a]Male = 1; Female = 2

[b]Enlisted = 1; Officer = 2

[c]Low muscular demands = 1; High muscular demands = 2.

Table 4

Relative Percent Body Fat for American Male Subjects[a]

Age Group (Years)	Naval Health Research Center	California Highway Patrol	National Athletic Health Institute	Froelicher el al.	University of California - Davis
20-24	15.0 ± 0.18 (825)	24.4 ± 4.45 (5)	17.1 ± 3.82 (8)	18.9 ± 0.87 (44)	17.7 ± 1.18 (9)
25-29	16.5 ± 0.17 (1099)	20.5 ± 0.67 (52)	21.0 ± 1.30 (31)	20.8 ± 0.54 (117)	19.8 ± 1.62 (31)
30-34	17.8 ± 0.18 (883)	23.5 ± 0.67 (56)	19.5 ± 0.77 (72)	21.5 ± 0.56 (99)	20.1 ± 0.95 (60)
35-39	18.2 ± 0.18 (807)	24.2 ± 1.18 (18)	21.1 ± 0.78 (67)	22.4 ± 0.54 (113)	22.2 ± 0.84 (85)
40-44	17.8 ± 0.23 (382)	27.5 ± 2.83 (5)	21.9 ± 0.68 (82)	22.0 ± 0.79 (59)	
45-49	18.9 ± 0.43 (125)	24.9 ± 1.25 (2)	24.4 ± 0.72 (90)	22.9 ± 0.74 (68)	
50-54	20.4 ± 1.02 (24)	17.9 (1)	25.4 ± 0.72 (62)	23.5 ± 1.47 (19)	
55-59	18.7 ± 3.32 (3)	33.2 (1)	25.4 ± 1.02 (23)		

[a]Values are means ± standard error of the mean and (n). Tabled values for all samples except Naval Health Research Center are from Wilmore and Davis (1979).

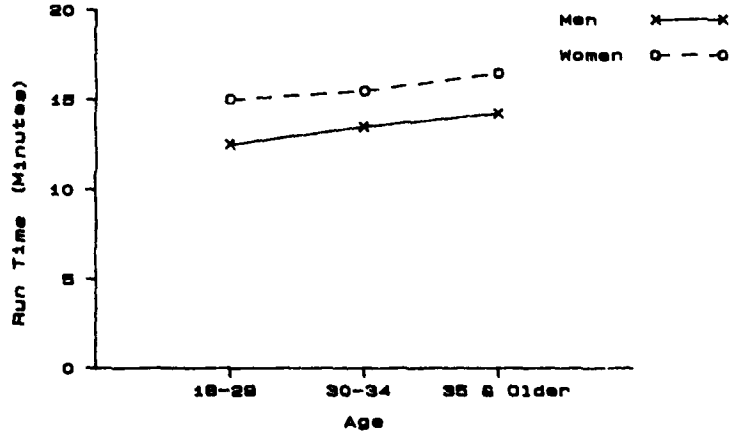


Figure 1. Mean 1.5-Mile Run Time For Men and Women By Age Group

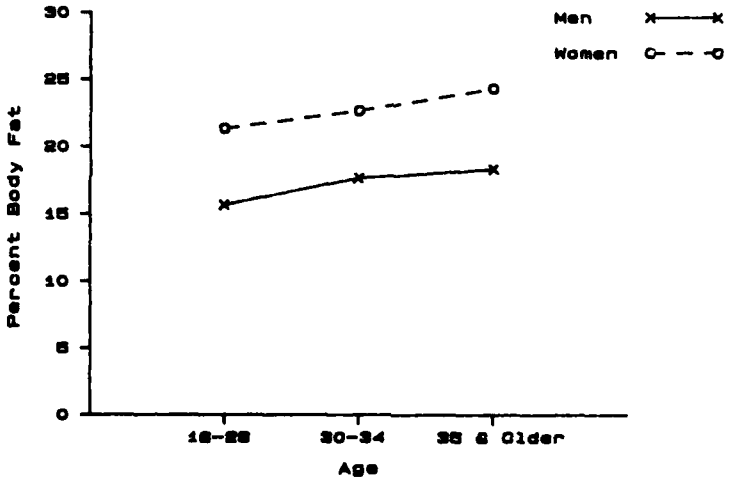


Figure 2. Mean Percent Body Fat For Men and Women By Age Group

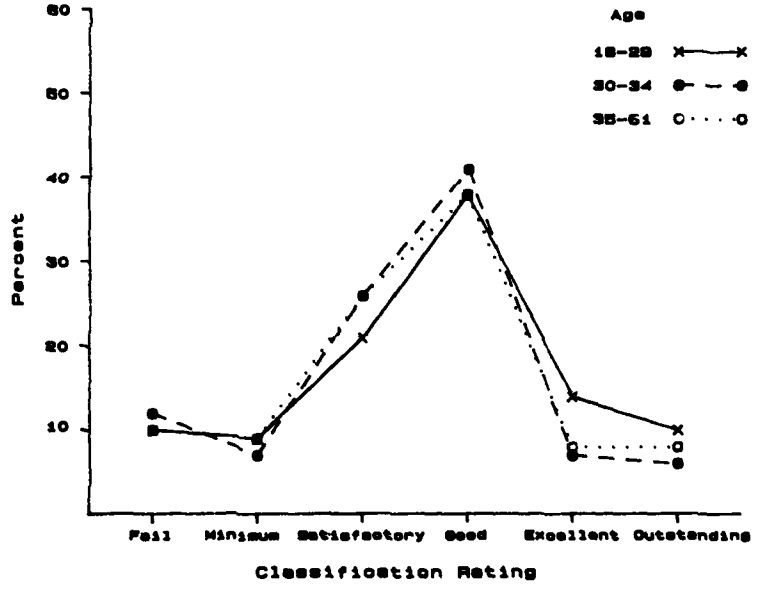


Figure 9. Distribution of 1.5-Mile Run Classification Ratings Within Age Groups

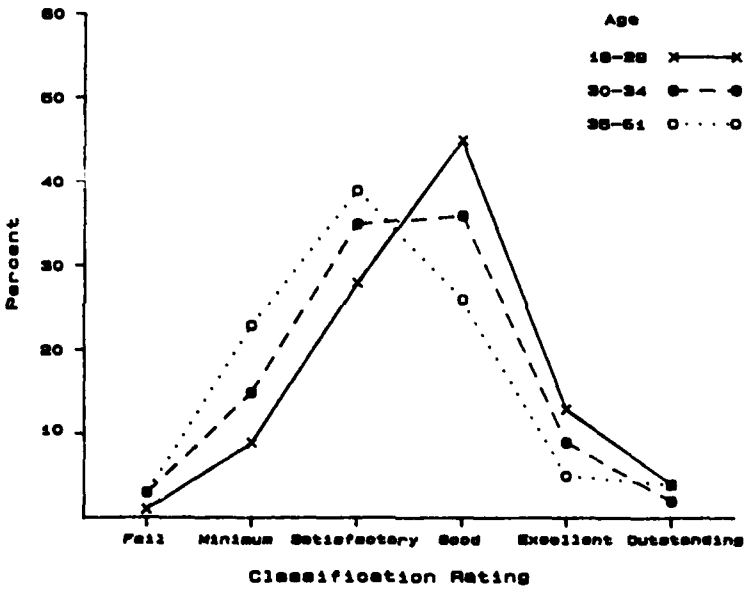


Figure 4. Distribution of Sit-ups Classification Ratings Within Age Groups

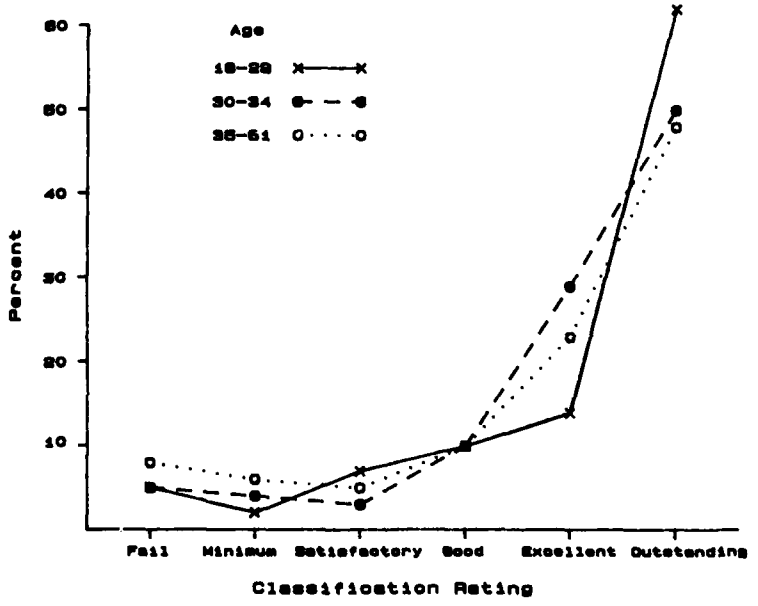


Figure 5. Distribution of Sit-Reach Classification Ratings Within Age Groups

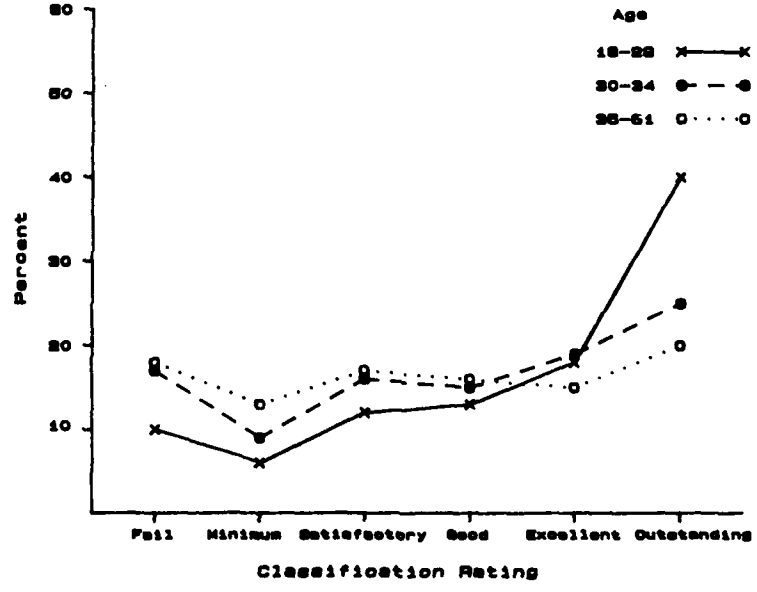


Figure 5. Distribution of Body Fat Classification Ratings Within Age Groups

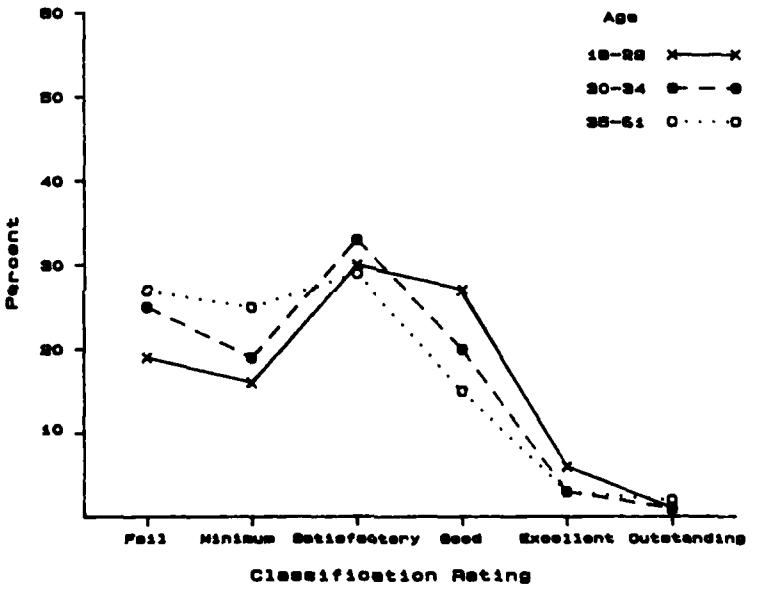


Figure 7. Distribution of Overall Classification Ratings Within Age Groups

APPENDICES A THROUGH D

APPENDIX A

PHYSICAL FITNESS TEST RESULTS

BACKGROUND

1. DUTY STATION		2. DATE Month ___ / Day ___ / Year ___
3. NAME: LAST, FIRST, M.I. *(Please print)*		4. RATE/RANK
5. AGE ___ ___	6. SEX ☐ 1. MALE ☐ 2. FEMALE	7. SOCIAL SECURITY NUMBER ___ ___ ___ - ___ ___ - ___ ___ ___ ___

BODY MEASUREMENTS

8. HEIGHT WITHOUT SHOES *(Nearest inch)* ___ ___ Inches		9. WEIGHT (Minimum clothing) *(Nearest pound)* ___ ___ ___ Pounds
CIRCUMFERENCE *Enter average (to nearest 1/8 inch) of two measurements each, minimum clothing.*		
10. NECK ___ ___ - ___ / ___ Inches Fraction		11. ABDOMEN ___ ___ - ___ / ___ Inches Fraction
Items 12, 13, 14, WOMEN ONLY		
12. BICEP ___ ___ - ___ / ___ Inches Fraction	13. FOREARM ___ ___ - ___ / ___ Inches Fraction	14. THIGH ___ ___ - ___ / ___ Inches Fraction

TEST SCORES

		CLASSIFICATION RATING *(Circle appropriate rating)*						
		Out-standing	Excel-lent	Good	Satis-factory	Minimal	Fail	Medical Excuse
A. **PERCENT BODY FAT** *(See tables)*	___ ___ . ___	5	4	3	2	1	0	9
B. **SIT UPS** *(2 minutes)*	___ ___ ___	5	4	3	2	1	0	9
C. **SIT REACH** *(Circle + or −)*	+ − ___ ___ . ___	5	4	3	2	1	0	9
D. **1.5 MILE RUN** **(See substitution below)*	___ ___ : ___ ___ Minutes Seconds	5	4	3	2	1	0	9
	OVERALL RATING	5	4	3	2	1	0	9
***IF SUBSTITUTED FOR 1.5 MILE RUN:**								
RUN IN PLACE *(3 minutes)*	___ ___ ___ Number of steps	5	4	3	2	1	0	9

NHRC–6500.040-0601 (06-83)

Retain original and forward copy to Naval Health Research Center, Code 40, P.O. Box 85122, San Diego, CA 92138

APPENDIX B

Stepwise Multiple Regression Analyses of Demographic Variables on Health and Physical Readiness Test Scores

Test	Variable	Multiple R	R^2	B
1.5-Mile Run				
	Sex[a]	.27	.07*	2.65
	Age	.45	.20*	.13
	Military Status[b]	.47	.23	-1.43
Sit-ups				
	Age	.36	.13*	- .84
	Military Status	.39	.15	9.30
Sit-reach				
	Age	.24	.06*	- .10
	Military Status	.27	.07	1.23
	Sex	.28	.08	.86
Percent Body Fat				
	Sex	.31	.09*	6.26
	Age	.38	.14*	.18

[a]Male = 1; Female = 2.

[b]Enlisted = 1; Officer = 2

*Variable uniquely contributed 5% or more to explained criterion variance.

CLASSIFICATION RATING FOR 1.5-MILE RUN (MEN)

Count Column percent ( )		AGE						
Classification Rating		18-29	30-34	35-39	40-44	45-49	50 and Older	Row Total
Fail	N	184	78	57	24	12	2	357
	Col. %	(8.0)	(8.4)	(6.9)	(6.5)	(10.3)	(8.3)	(7.8)
Minimum	N	191	61	73	41	6	1	373
	Col. %	(8.3)	(6.6)	(8.8)	(11.1)	(5.1)	(4.2)	(8.2)
Satisfactory	N	544	257	232	86	28	6	1153
	Col. %	(23.5)	(27.8)	(28.1)	(23.3)	(23.9)	(25.0)	(25.2)
Good	N	904	410	347	150	47	9	1867
	Col. %	(39.1)	(44.4)	(42.0)	(40.7)	(40.2)	(37.5)	(40.8)
Excellent	N	290	74	55	34	11	2	466
	Col. %	(12.5)	(8.0)	(6.7)	(9.2)	(9.4)	(8.3)	(10.2)
Outstanding	N	198	44	63	34	13	4	356
	Col. %	(8.6)	(4.8)	(7.6)	(9.2)	(11.1)	(16.7)	(7.8)
Column Total	N	2311	924	827	369	117	24	4572
	Col. %	(50.5)	(20.2)	(18.1)	(8.1)	(2.6)	(0.5)	(100.0)

CLASSIFICATION RATING FOR SIT-UPS (MEN)

Count Column percent ( )		AGE						
Classification Rating		18-29	30-34	35-39	40-44	45-49	50 and Older	Row Total
Fail	N	48	48	28	6	6	3	139
	Col. %	(2.0)	(5.1)	(3.3)	(1.6)	(4.9)	(11.1)	(3.0)
Minimum	N	249	162	197	83	38	4	733
	Col. %	(10.6)	(17.2)	(23.3)	(21.8)	(31.1)	(14.8)	(15.7)
Satisfactory	N	676	344	331	168	32	13	1564
	Col. %	(28.7)	(36.5)	(39.1)	(44.2)	(26.2)	(48.1)	(33.5)
Good	N	1061	305	236	89	30	5	1726
	Col. %	(45.1)	(32.3)	(27.9)	(23.4)	(24.6)	(18.5)	(36.9)
Excellent	N	262	63	35	19	11	1	391
	Col. %	(11.1)	(6.7)	(4.1)	(5.0)	(9.0)	(3.7)	(8.4)
Outstanding	N	58	21	19	15	5	1	119
	Col. %	(2.5)	(2.2)	(2.2)	(3.9)	(4.1)	(3.7)	(2.5)
Column Total	N	2354	943	846	380	122	27	4672
	Col. %	(50.4)	(20.2)	(18.1)	(8.1)	(2.6)	(0.6)	(100.0)

CLASSIFICATION RATING FOR SIT-REACH (MEN)

Count Column percent ( )		AGE						
Classification Rating		18-29	30-34	35-39	40-44	45-49	50 and Older	Row Total
Fail	N	134	53	62	33	13	3	298
	Col. %	(5.7)	(5.6)	(7.4)	(8.7)	(10.7)	(11.1)	(6.4)
Minimum	N	39	34	53	28	2	--	156
	Col. %	(1.7)	(3.6)	(6.3)	(7.4)	(1.6)	--	(3.3)
Satisfactory	N	134	18	29	17	16	7	221
	Col. %	(5.7)	(1.9)	(3.5)	(4.5)	(13.1)	(25.9)	(4.7)
Good	N	232	73	84	39	9	2	439
	Col. %	(9.8)	(7.8)	(10.0)	(10.3)	(7.4)	(7.4)	(9.4)
Excellent	N	290	296	210	99	24	6	925
	Col. %	(12.3)	(31.5)	(25.0)	(26.2)	(19.7)	(22.2)	(19.8)
Outstanding	N	1527	466	402	162	58	9	2624
	Col. %	(64.8)	(49.6)	(47.9)	(42.9)	(47.5)	(33.3)	(56.3)
Column Total	N	2356	940	840	378	122	27	4663
	Col. %	(50.5)	(20.2)	(18.0)	(8.1)	(2.6)	(0.6)	(100.0)

CLASSIFICATION RATING FOR PERCENT BODY FAT (MEN)

Count
Column percent ( )

Classification Rating		AGE 18-29	30-34	35-39	40-44	45-49	50 and Older	Row Total
Fail	N	198	109	101	31	20	8	467
	Col. %	(11.2)	(17.7)	(19.4)	(12.4)	(24.4)	(38.1)	(14.3)
Minimum	N	132	59	66	38	5	2	302
	Col. %	(7.5)	(9.6)	(12.7)	(15.1)	(6.1)	(9.5)	(9.3)
Satisfactory	N	190	94	79	49	17	4	433
	Col. %	(10.7)	(15.3)	(15.2)	(19.5)	(20.7)	(19.0)	(13.3)
Good	N	229	89	84	41	16	3	462
	Col. %	(12.9)	(14.4)	(16.1)	(16.3)	(19.5)	(14.3)	(14.2)
Excellent	N	256	109	85	33	10	1	494
	Col. %	(14.5)	(17.7)	(16.3)	(13.1)	(12.2)	(4.8)	(15.2)
Outstanding	N	764	156	106	59	14	3	1102
	Col. %	(43.2)	(25.3)	(20.3)	(23.5)	(17.1)	(14.3)	(33.8)
Column Total	N	1769	616	521	251	82	21	3260
	Col. %	(54.3)	(18.9)	(16.0)	(7.7)	(2.5)	(0.6)	(100.0)

OVERALL CLASSIFICATION RATING (MEN)

Count Column percent ( )		AGE						
Classification Rating		18-29	30-34	35-39	40-44	45-49	50 and Older	Row Total
Fail	N	340	150	140	52	22	6	710
	Col. %	(20.2)	(25.5)	(28.9)	(22.4)	(31.0)	(35.3)	(23.1)
Minimum	N	273	109	116	66	18	2	584
	Col. %	(16.2)	(18.5)	(23.9)	(28.4)	(25.4)	(11.8)	(19.0)
Satisfactory	N	473	187	135	71	13	8	887
	Col. %	(28.1)	(31.8)	(27.8)	(30.6)	(18.3)	(47.1)	(28.8)
Good	N	472	121	78	30	10	--	711
	Col. %	(28.0)	(20.6)	(16.1)	(12.9)	(14.1)	--	(23.1)
Excellent	N	103	17	11	6	6	--	143
	Col. %	(6.1)	(2.9)	(2.3)	(2.6)	(8.5)	--	(4.6)
Outstanding	N	24	4	5	7	2	1	43
	Col. %	(1.4)	(0.7)	(1.0)	(3.0)	(2.8)	(5.9)	(1.4)
Column Total	N	1685	588	485	232	71	17	3078
	Col. %	(54.7)	(19.1)	(15.8)	(7.5)	(2.3)	(0.6)	(100.0)

CLASSIFICATION RATING FOR 1.5-MILE RUN (WOMEN)

Count
Column percent ( )

Classification Rating		AGE[a] 18-29	30-34	35 and Older	Row Total
Fail	N	72	8	3	83
	Col. %	(11.8)	(9.2)	(12.5)	(11.5)
Minimum	N	66	2	1	69
	Col. %	(10.8)	(2.3)	(4.2)	(9.6)
Satisfactory	N	159	36	9	204
	Col. %	(26.1)	(41.4)	(37.5)	(28.3)
Good	N	209	26	7	242
	Col. %	(34.3)	(29.9)	(29.2)	(33.6)
Excellent	N	63	9	3	75
	Col. %	(10.3)	(10.3)	(12.5)	(10.4)
Outstanding	N	41	6	1	48
	Col. %	(6.7)	(6.9)	(4.2)	(6.7)
Column Total	N	610	87	24	721
	Col. %	(84.6)	(12.1)	(3.3)	(100.0)

[a]Because only four women in this analysis were over 39 years of age, the top four age categories were collapsed into one group ("35 and Older").

CLASSIFICATION RATING FOR SIT-UPS (WOMEN)

Count
Column percent ( )

Classification Rating		AGE[a] 18-29	30-34	35 and Older	Row Total
Fail	N	13	5	--	18
	Col. %	(2.1)	(5.6)	--	(2.4)
Minimum	N	34	15	2	51
	Col. %	(5.4)	(16.7)	(7.7)	(6.8)
Satisfactory	N	193	17	11	221
	Col. %	(30.5)	(18.9)	(42.3)	(29.5)
Good	N	260	37	4	301
	Col. %	(41.1)	(41.1)	(15.4)	(40.2)
Excellent	N	98	12	6	116
	Col. %	(15.5)	(13.3)	(23.1)	(15.5)
Outstanding	N	35	4	3	42
	Col. %	(5.5)	(4.4)	(11.5)	(5.6)
Column Total	N	633	90	26	749
	Col. %	(84.5)	(12.0)	(3.5)	(100.0)

[a]Because only four women in this analysis were over 39 years of age, the top four age categories were collapsed into one group ("35 and Older").

CLASSIFICATION RATINGS FOR SIT-REACH (WOMEN)

Count
Column percent ( )

Classification Rating		AGE[a] 18-29	30-34	35 and Older	Row Total
Fail	N	32	7	2	41
	Col. %	(5.1)	(7.6)	(7.4)	(5.5)
Minimum	N	10	5	2	17
	Col. %	(1.6)	(5.4)	(7.4)	(2.3)
Satisfactory	N	110	3	4	117
	Col. %	(17.4)	(3.3)	(14.8)	(15.6)
Good	N	74	20	6	100
	Col. %	(11.7)	(21.7)	(22.2)	(13.3)
Excellent	N	86	23	4	113
	Col. %	(13.6)	(25.0)	(14.8)	(15.0)
Outstanding	N	320	34	9	363
	Col. %	(50.6)	(37.0)	(33.3)	(48.3)
Column Total	N	632	92	27	751
	Col. %	(84.2)	(12.3)	(3.6)	(100.0)

[a]Because only four women in this analysis were over 39 years of age, the top four age categories were collapsed into one group ("35 and Older").

CLASSIFICATION RATING FOR PERCENT BODY FAT (WOMEN)

Count Column Percent ( )		AGE[a]			
Classification Rating		18-29	30-34	35 and Older	Row Total
Fail	N	29	6	2	37
	Col. %	(6.2)	(9.5)	(10.5)	(6.7)
Minimum	N	9	2	1	12
	Col. %	(1.9)	(3.2)	(5.3)	(2.2)
Satisfactory	N	82	15	6	103
	Col. %	(17.5)	(23.8)	(31.6)	(18.7)
Good	N	69	10	1	80
	Col. %	(14.7)	(15.9)	(5.3)	(14.5)
Excellent	N	146	17	9	172
	Col. %	(31.2)	(27.0)	(47.4)	(31.3)
Outstanding	N	133	13	--	146
	Col. %	(28.4)	(20.6)	--	(26.5)
Column Total	N	468	63	19	550
	Col. %	(85.1)	(11.5)	(3.5)	(100.0)

[a]Because only four women in this analysis were over 39 years of age, the top four age categories were collapsed into one group ("35 and Older").

OVERALL CLASSIFICATION RATING (WOMEN)

Count
Column percent ( )

Classification Rating		AGE[a] 18-29	30-34	35 and Older	Row Total
Fail	N	71	11	5	87
	Col. %	(16.4)	(19.3)	(27.8)	(17.2)
Minimum	N	59	11	2	72
	Col. %	(13.7)	(19.3)	(11.1)	(14.2)
Satisfactory	N	169	23	8	200
	Col. %	(39.1)	(40.4)	(44.4)	(39.4)
Good	N	104	8	2	114
	Col. %	(24.1)	(14.0)	(11.1)	(22.5)
Excellent	N	25	4	1	30
	Col. %	(5.8)	(7.0)	(5.6)	(5.9)
Outstanding	N	4	--	--	4
	Col. %	(0.9)	--	--	(0.8)
Column Total	N	432	57	18	507
	Col. %	(85.2)	(11.2)	(3.6)	(100.0)

[a]Because only four women in this analysis were over 39 years of age, the top four age categories were collapsed into one group ("35 and Older").

APPENDIX D

Accuracy of Data Transformation into Classification Ratings for Group 1 and Group 2

Test	Group 1 Percent of Accurate Classifications	Group 1 (Percent of Errors Favoring Participants)	Group 1 N	Group 2 Percent of Accurate Classifications	Group 2 (Percent of Errors Favoring Participants)	Group 2 N
1.5-Mile Run	.92	(.56)	1711	.87	(.71)	1134
Sit-ups	.96	(.60)	1766	.95	(.68)	1156
Sit-reach	.96	(.41)	1770	.97	(.47)	1139
Percent Body Fat	.87	(.71)	1147	.87	(.89)	931
Overall	.76	(.91)	1037	.84	(.82)	623

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 84-1	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) An Analysis of Baseline Navy Health and Physical Readiness data from Local Shore Facilities		5. TYPE OF REPORT & PERIOD COVERED Interim 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) D. Stephen Nice, Linda Dutton, and George Edw. Seymour		8. CONTRACT OR GRANT NUMBER(s) NMPC Reinbursable
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Health Research Center P.O. Box 85122 San Diego, California 92138		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Medical Research and Development Command Naval Medical Command, National Capital Region Bethesda, Maryland 20814		12. REPORT DATE January 1984 13. NUMBER OF PAGES 47
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Commander, Naval Medical Command Department of the Navy Washington, D.C. 20372		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

Approved for public release; distribution unlimited.

18. SUPPLEMENTARY NOTES

To be presented at the Annual Meeting of the American Psychological Association to be held in Toronto, Canada, August 1984.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Health	Cardiorespiratory endurance
Physical readiness	1.5-mile run
Sit-ups	Program evaluation
Sit-reach	Physical fitness
Percent body fat	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

In October 1982, the Navy promulgated OPNAVINST 6110.1B which established the Health and Physical Readiness Program. This program included an annual physical fitness test with a series of graded physical performance standards. In order to evaluate the impact of this program, baseline physical readiness data were collected on a sample of 6,182 Navy personnel prior to program implementation. Required physical readiness measures included 1.5-Mile Run, Sit-ups, Sit-reach, and Percent Body Fat.

Although demographic factors, such as age and/or sex, were significantly

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

related to performance, the magnitude of effect was relatively small. The distributions of classification ratings were symmetrical for the 1.5-Mile Run and the Sit-ups tests and were negatively skewed (mode = Outstanding) for the Sit-Reach and the Percent Body Fat tests. A total of 22% of the sample failed to meet the minimum overall classification rating which is set equivalent to the lowest individual test classification. Inadequate performance in the Percent Body fat and the 1.5-Mile Run tests contributed substantially to the overall failure rate. Further research is needed to determine the relationships between these physical readiness test scores and organizationally relevant outcomes (e.g., health, performance, retention) and to evaluate the impact of various program interventions.